

REMARKS

Reconsideration of this application is requested in view of the amendments to the claims and the remarks presented herein.

The claims in the application are claims 1 to 11, 13 and 17 to 20, all other claims having been cancelled.

Claims 2, 4, 7, 11, 13 and 20 were rejected under 35 USC 112, second paragraph, as being indefinite. The Examiner objected to the term “especially” in claim 2 and the phrase “in that” in claim 4. Claim 7 was objected to as not having antecedent basis for the co-surfactant. Claim 11 was rejected as being indefinite in the weight ratio and claim 13 lacked antecedent basis. Claim 20 was objected to as reading upon claim 19 which did not recite a dry mixture.

Applicants respectfully traverse these grounds of rejection since the amended claims are believed to comply with 35 USC 112. Claim 2 has been amended to delete the term “especially”. Claim 13 now recites a dispersion of claim 4 as a thickened and/or viscous organic solvent and it is believed to have proper antecedent basis for the same. Claim 20 has been amended to indicate that the composition of claim 19 has been dried. Therefore, the amended claims are definite and withdrawal of this ground of rejection is requested.

Claims 1 to 11, 13 and 17 to 20 were rejected under 35 USC 103 as being obvious over the Cantiani et al patent. The Examiner states that the Cantiani et al patent discloses a composition comprising cellulose nanofibrils at least one co-additive and a process for preparing the composition by adding the two additives to the nonofibril suspension, drying the suspension and redispersing the composition, referring to lines 10 to 45 of column 3.

Applicants respectfully traverse this ground of rejection since the Cantiani et al patent does not relate to Applicants' invention but, rather, describes a composition comprising essentially amorphous cellulose nanofibrils, carboxy-cellulose with a degree of substitution less than or equal to 0.95 as additive and optionally at least one co-additive, the content of the additive and of optional co-additive being less than or equal to 30% by weight relative to the weight of the nanofibrils and of additive and optional co-additive. According to a preferred embodiment, the composition contains carboxymethyl cellulose and co-additives of a cationic or amphoteric surfactant and the reference relates more particularly to the problem concerning drying cellulose microfibrils as indicated in lines 32 and 33 of column 1.

The Cantiani et al patent relates to the problem of cellulose microfibrils and nanofibrils obtained in the form of an aqueous suspension who cellulose content is relatively low. Therefore, attempts have been to present them in a dry form but unfortunately, when the cellulose microfibril or nanofibril suspensions are dried, strong

hydrogen bonds are created between the fibrils which make it necessary to use very high shear means to redisperse these fibrils as indicated in lines 19 to 31 of column 1.

Therefore, the invention of Cantiani et al provides a solution to the problem of drying cellulose microfibrils by using relatively low amounts of additive to allow good redispersion of the dry nanofibrils without it being necessary to use extremely high shear conditions as indicated in lines 36 to 43 of column 2. The reference also relates to the process for preparing the composition by means of a step up preparation of an aqueous suspension of nanofibrils to which an additive and optionally a co-additive are added followed by a step of drying the suspension, for example, by evaporation.

The problem faced by the Cantiani et al patent is a different one from the problem faced by Applicants since the present invention relates to a colloidal dispersion in an organic solvent of microfibrils and/or of microcrystals of a fibrillar organic substance selected from the group consisting of cellulose chitin and polysaccharides such as β 1 \rightarrow 3 glucan, β 1 \rightarrow 3 xylan and β 1 \rightarrow 4 mannan, in addition, containing at least one compound possessing a hydrophilic and a hydrophobic part. One of the aims of Applicants' invention is to supply suspensions or dispersions of microfibrils and/or microcrystals especially of cellulose or any other fibrillar organic substance in the organic solvents for which the said suspensions or dispersions had, until now, been impossible to produce. Another object of the invention is to supply stable suspensions or dispersions of cellulose microfibrils and/or microcrystals in organic solvents especially

apolar or slightly polar solvents without chemical modification of the cellulose. Another aspect of Applicants' invention is to supply aqueous dispersions or suspensions of microcrystals and/or microfibrils especially of cellulose which once they have been dried, can be redispersed in water or in an organic solvent while preserving their properties of dispersion.

The Cantiani et al patent does not disclose the dispersion of cellulose nanofibrils in an organic solvent. In fact, all of the examples of the reference are aqueous dispersions and organic solvents, especially apolar or weakly solvents, are never mentioned. It is impossible to obtain Applicants' invention by the process described by Cantiani et al since, as one of the preferred methods of the reference, to prepare a cellulose dispersion with carboxymethyl cellulose with a low degree of substitution, would lead to flocculating suspensions in an organic solvent such as cyclohexane or toluene.

One of the Examiner's arguments is based on the dispersion of cellulose nanofibrils in alcohol contemplated by Cantiani et al (column 9, lines 1 to 6) but a precise reading of this paragraph indicates that the author claims the precipitation of the cellulose nanofibrils in alcohol and not a dispersion which is the opposite phenomenon. Indeed, one skilled in the art knows that this type of CMC is only soluble in water and this proves that following the Cantiani et al teaching, it is impossible to disperse cellulose nanofibrils

in even reasonably polar solvents such as isoproponyl, so *a fortiori* in apolar solvents.

The alcohol in the reference is used for a concentration step by precipitation prior to the step of drying.

Applicants wish to call the Examiner's attention to the PCT application WO 00/15667 with a March 23, 2000 filing date wherein Mr. Cantiani is one of the inventors. This application, which was filed after the cited Cantiani et al patent, describes a way to obtain stable suspensions of cellulose nanofibrils in organic solvents by chemical grafting of silyl derivatives which is very different from the physical absorption of surfactants described in Applicants' invention. In the said PCT application, the inventors proposed what they called a new way to disperse cellulose nanofibrils in apolar solvents. Thus, if one skilled in the art would be led to Applicants' invention from the teachings of the Cantiani et al patent such as the method using chemical grafting is more complicated than a method of physical absorption, Cantiani would have used their preceding invention such as described in U.S. Patent NO. 6,231,657 to obtain stable suspensions of cellulose nanofibrils in organic solvents instead of using chemical grafting. This means that the Cantiani et al patent does not render Applicants' invention obvious to one skilled in the art since one would not obtain colloidal dispersions according to Applicants' invention by applying the teachings of the Cantiani et al patent. In fact, Cantiani et al does not mention the same problem as Applicants' problem solved by Applicants' invention.

In one of the Examiner's remarks, he insists on the lack of precision concerning the needed amount of surfactant and the absorbed quantity. However, it is within the skill of a man in the art without an undue burden to determine according to the origin of the nanofibrils and of the needed amount of surfactant and to measure the absorbed surfactant. However, one example can be shown in the case of cotton nanofibrils and the surfactant t BNA from CECCA . A series of a lyophilized dried paste containing tunicate whiskers and the BNA surfactant were prepared as described in Example 1 with weight ratios of surfactant to cellulose varying from 1/2 to 8/1. 1 gram of this dry paste was redispersed in 100 ml of cyclohexane using an Ultra-Turrax apparatus operated at 3,000 rmd/min for 5 minutes. The results are presented in the following table:

BNA/cellulose ratio	1/2	1/1	2/1	3/1	4/1	6/1	8/1
Visual inspection	Flocculating, large aggregates	Flocculating, large aggregates	Flocculating, small aggregates	Non flocculating	Non flocculating	Non flocculating	Non flocculating

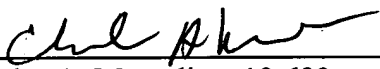
It can be seen from the Table that the preferred BNA/cellulose ratios range from 3/1 to 8/1.

The adsorption measurements were taken using 1 gram of the dried paste with a weight ratio of 4/1 being dispersed in 100 ml of cyclohexane using an Ultra-Turrax apparatus operated at 13,000 rmd/min for 5 minutes. The resulting birefringent

suspension was then centrifuged for 3 hours at 21,000 grams until a non-birefringent supernatant was observed. The trace of solvent was then removed from the resulting pellet and the weight of the dry material was 0.52 grams indicating an adsorption of 0.32 grams of surfactant (1.6 gram of BNA per gram of cellulose). Therefore, it is clear that the reference does not render obvious Applicants' invention and withdrawal of this ground of rejection is requested.

In view of the amendments to the claims and the above remarks, it is believed that the claims clearly point out Applicants' patentable contribution and favorable reconsideration of the application of the application is requested.

Respectfully submitted,
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Enclosures